

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2023****Subject Code:3161922****Date:14-07-2023****Subject Name:Advanced Manufacturing Processes****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) What are the advantages of non-conventional machining processes over conventional machining processes?	03
	(b) What are the different modes of operation of plasma torches? Explain any one.	04
	(c) List and explain the various factors to be considered for selecting machining processes.	07
Q.2	(a) What are the requirements of dielectric fluid in EDM? Mention any two dielectric fluids used in EDM process.	03
	(b) What is ultrasonic machining? Explain the ultrasonic machining process with a schematic diagram.	04
	(c) With a neat sketch, explain the principal of water jet machining.	07
OR		
	(c) Find out the approximate time required to machine a hole of diameter 6 mm in a Tungsten carbide plate. (Flow strength of work material 6.9×10^9 N/mm ²) of thickness equal to one and half time of hole diameter. The mean abrasive grain size is 0.015 mm diameter. The feed force is equal to 3.5 N. The amplitude of tool oscillations is 25 micron. And the frequency is equal to 25 KHz. The tool material is copper having flow strength 1.5×10^9 N/mm ² . The slurry contains one part of abrasives to one part of water. Take the values of different constant as $k_1=0.3$, $k_2=1.8 \times 10^{-6}$ in SI Units and $K_3=0.6$ and abrasive slurry density= 3.8 gm/cm ³ . (Use grain hammering model)	07
Q.3	(a) What are the various elements of electrochemical machining process? Explain.	03
	(b) What is insulation to the ECM tool? Why is it required? Explain.	04
	(c) In chemical milling operation on a flat mild steel plate, it is desired to cut an ellipse-shaped pocket to a depth of 10 mm. The semi axes of the ellipse are, $a = 225$ mm and $b = 150$ mm. A solution of hydrochloric and Nitric acids will be used as the etchant. Determine (1) Metal removal rate in mm ³ /hr. (2) Time required to etch to depth and (c) Required dimensions of the opening in the cut and peel maskant required to achieve the desired pocket size on the part. (Take Etch Factor = 2)	07
OR		
Q.3	(a) What is plasma arc machining? Explain mechanism of the metal removal.	03

- (b) With a sketch, explain the principal of EBM. **04**
- (c) Explain with sketch the principal of operation, mechanism of metal removal of laser beam machining. Also write advantage, disadvantages and application of laser beam machining. **07**
- Q.4** (a) Define STL file format. What are the issues associated with STL file format? **03**
- (b) Explain photo-polymerization phenomenon of stereo lithography systems. **04**
- (c) Explain with sketch Fusion Deposition Modeling (FDM) principle, process parameter and applications. **07**
- OR**
- Q.4** (a) What are the difference between STL, OBJ and AMF file Formats? **03**
- (b) List down five most commonly used polymers in Additive manufacturing. Explain their advantages and limitations. **04**
- (c) Explain Laminated Object Manufacturing (LOM) principle, process parameter and applications. **07**
- Q.5** (a) Write glass compositions and its properties. **03**
- (b) List glass forming process. Explain any one in details. **04**
- (c) Explain with sketch hand-Lay up process. Give advantages and limitations of it. **07**
- OR**
- Q.5** (a) Give classification of composites material. **03**
- (b) Explain phase transformation in glass during solidification. **04**
- (c) Explain with sketch vacuum-bag moulding process. Give advantages and limitations of it. **07**
